J. New York Entomol. Soc. 102(1):79–85, 1994

PLUSIOTIS CITLALTEPETLAMAYATLI, A NEW SPECIES OF THE *LECONTEI* GROUP FROM MEXICO (COLEOPTERA: MELOLONTHIDAE; RUTELINAE)

JULIAN BLACKALLER-BAGES AND LEONARDO DELGADO

Instituto de Ecologia, A.C. Apartado postal 63, Xalapa, Veracruz 91000, Mexico

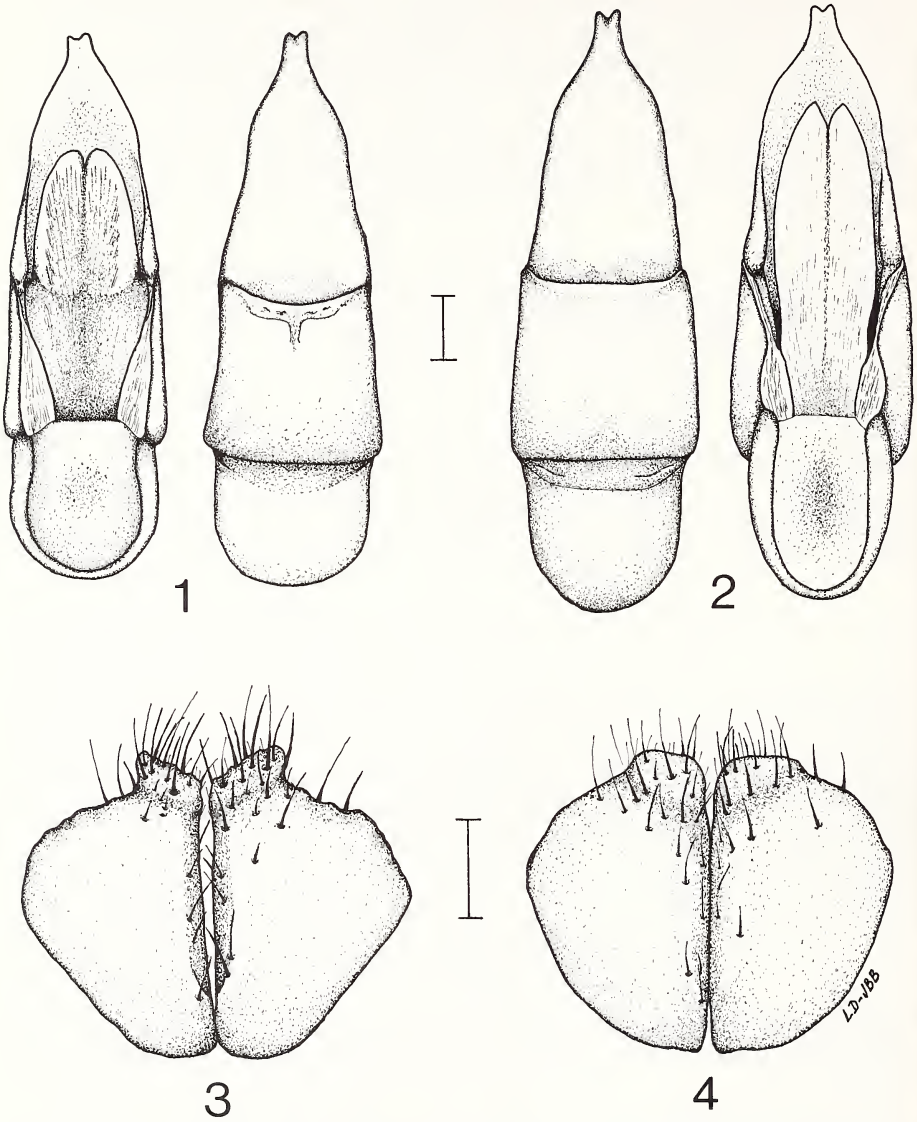
Abstract.—A new species of the *lecontei* group of *Plusiotis* is described, based on recently collected material in the state of Veracruz, Mexico. The distinctive characteristics are illustrated, a key to separate the species of the *lecontei* group is presented, and its eco-geographical distribution is outlined and compared with that of the fir forest.

Resumen.—Se describe una nueva especie de *Plusiotis* del grupo *lecontei* con base en material recientemente colectado en el estado de Veracruz, México. Se ilustran sus caracteristicas distintivas comentando sus relaciones con las demas especies del grupo. Se presenta una clave para la separacion de las especies comprendidas dentro del grupo *lecontei* y por ultimo se comenta su distribucion ecogeográfica discutiendo sus relaciones con el bosque de abeto.

The *lecontei* species group comprises seven closely related species, which are distributed from the southwestern U.S. to the Guatemalan mountains at elevations between 2,000–3,800 m usually occupied by fir or pine-fir forests (Morón, 1990). Specimens recently collected on the Atlantic slopes of the Citlaltepetl volcano represent a new species of the *lecontei* group of *Plusiotis.* This is described here and a key to separate the species of this group is included. Lastly, the distribution of this group is briefly compared with the fir forest distribution.

Plusiotis citlaltepetlamayatli, new species
Figs. 1, 3, 5

Description. Holotype male. Length 28.8 mm, maximum width 14.2 mm. Dorsum brilliant greenish-yellow; marginal regions of clypeus, lateral regions of pronotum, scutellum and tibiae dark pink; apical calla of elytra golden; tarsi with a reddish-green metallic tint. Clypeus semicircular with an inconspicuous apical emargination, lateral margins slightly raised; clypeus and frons with dense punctures, becoming confluent toward apex of clypeus. Interocular distance equal to 2.4 transverse diameters of an eye. Antennal club shorter than interocular distance (0.70:1). Labrum slightly stout, medially slightly excavated, ventral border truncate and exposed (frontal view). Apex of labium broadly sinuate, with two central, effaced teeth. Pronotum with lateral borders almost evenly curved, anterior and posterior angles of pronotum rounded; pronotum margined except at central half of apical border; disc of pronotum with small and moderately dense punctures, laterally more dense. Scutellum as long as wide. Elytral striae shallow; interstriae little convex, with scarce, medium-size



Figs. 1–4. Genitalia of *Plusiotis* spp. 1, Aedeagus of *P. citlaltepetlamayatli* in ventral (left) and dorsal (right) view. 2, Aedeagus of *P. alticola* in dorsal (left) and ventral (right) view. 3, Inferior plates of *P. citlaltepetlamayatli* in distal view. 4, Inferior plates of *P. difficilis* in distal view.

punctures. Epipleural fold extending just to level of second visible abdominal sternite. Pygidium little convex, without metallic shine, with rugose punctation on base and sides, sparser towards disc and apex and with apical, scarce setae. Thoracic sternites clothed with abundant, long setae. Prosternal process semitriangular and prominent,

5

Fig. 5. Dorsal habitus of *Plusiotis citlaltepetlamayatli.*

with scarce setigerous punctures on ventral face. Mesosternal process rounded, short but distinct. 1–4 visible abdominal sternites with scarce and small setae, last two almost glabrous; sixth sternite apically with broad emargination, medially with shallow transverse impression. Protarsi feebly thickened; femora slender with small, scarce punctures. Genitalia with parameres slightly asymmetrical, fused, sharply pointed, feebly notched at apex and slightly curved downward; ventral plates nearly symmetrical, depressed in basal three-fourths and apically rounded.

Allotype female. Length 30.1 mm; maximum width 15.1 mm. Similar to male except as follows: Marginal regions of clypeus and lateral regions of pronotum with dark pink color extended and tibiae with same color reduced. Clypeus with apex slightly raised. Epipleural fold extending a little beyond from level of second visible sternite. Mesosternal process a little more produced. Abdominal sternites with setae scarcer, fifth abdominal sternite less emarginate, sixth sternite without transverse impression and apically rounded. Protarsi not thickened; femora stouter. Inferior genital plates very convex with mesoapical borders lateraly recurved, and with setae on apex and inner border.

Variation. Length of males is 26.1 mm to 28.2 mm and maximum width varies from 13.5 mm to 13.9 mm; length of females is 29.9 mm to 31.4 mm and maximum width varies from 15.0 mm to 16.2 mm. Color pattern similar to that of the holotype, except for one specimen yellowish green; clypeus, scutellum and tibiae vary from pink predominant (common state) to green predominant (less common) and intensity of pink color varies from dark to clear. Labial apex varies from broadly sinuate (common state) to almost right (less common) with the 2 central teeth effaced or accentuated. Pronotal anterior angles vary from rounded (common state) to right (less common). Punctation on pronotum and elytra vary a little in density. Mesosternal process a little longer than that of holotype and parameres of male genitalia vary a little in length.

Type material. Holotype, male: MEXICO: VERACRUZ; Calcahualco Nueva Vaqueria Alt 2,560 m 20-VIII-1992 (between 18:45–21:15 hrs) G. Nogueira col. Allotype female same data as holotype, both eventually deposited in M. A. Morón collection (Xalapa, Mexico) final deposition at Instituto de Biologia UNAM (D.F., Mexico). Paratypes, nine males four females: 2 males 1 female, same data as holotype; 2 males 1 female, same data except between 5:00–6:00 hrs; 2 males same data except "perchando"; 1 male 1 female, same data except Alt 1,690 m; 1 male, Tecoanapa Bosque Mesofilo Alt 2,400 m 24-26-VI-1992 Capistran y Delgado cols.; 1 male 1 female, Tlacotiopa, Alt 2,630 m 30-VII-1992 Capistran y Delgado cols. Paratypes are deposited in the collections of California Academy of Sciences (San Francisco), H. & A. Howden (Ottawa), G. Nogueira (Guadalajara), M. A. Morón (Xalapa), C. Deloya (Xalapa), L. Delgado (D.F.), J. P. Beraud (Cuernavaca) and J. Blackaller (D.F.).

Etymology. The new species name, *citlaltepetlamayatli,* comes from the Mexican (Nahuatl) words: "*Citlaltepetl*" that means "the star's volcano" (name applied to the Pico de Orizaba volcano) and "*mayatli*" that means "beetle" in relation to the distribution of this beetle at the slopes of the Citlaltepetl volcano.

Remarks. Of the *lecontei* group, *Plusiotis difficilis* Morón (male unknown) is the species related most closely to *Plusiotis citlaltepetlamayatli* n. sp. However, *Plusiotis difficilis* presents color yellowish-green; clypeus semitriangular; labrum medially

strongly excavated and its ventral border sinuate and directed inside; distal margin of pronotum complete; scutellum wider than long; prosternal process small with long and several setae; abdominal sternites with several long setae; female inferior genital plates as in Figure 4. *Plusiotis citlaltepetlamayatli* presents color greenish-yellow; clypeus semicircular; labrum medially slightly excavated and its ventral border truncate and exposed; distal margin of pronotum incomplete; scutellum as long as wide; prosternal process large, prominent and with sparse setae; abdominal sternites glabrous or at most with very few short setae and female genital plates as in Figure 3. Another closely related species is *Plusiotis alticola* Bates which can be separated by the characters given in the following key and the shape of the male genitalia (Figs. 1–2).

KEY TO THE *LECONTEI* SPECIES GROUP OF *PLUSIOTIS*

1. Male and female with robust metafemora and metatibiae 2
1′. Male with slender metafemora and metatibiae, female with slightly widened metafemora and metatibiae 6
2. Sternal coloration metallic iridescent. Pygidium with metallic shine 3
2′. Sternal coloration brilliant. Pygidium without metallic shine 4
3. Antennal club longer than interocular distance. Clypeus semicircular. Jalisco, Mexico, Veracruz and D.F., Mexico ..... *Plusiotis orizabae* Bates
3′. Antennal club shorter than interocular distance. Clypeus semitrapezoidal. Arizona and New Mexico, U.S.; Sonora, Chihuahua, Sinaloa and Durango, Mexico ..... *Plusiotis lecontei* Horn
4. Sides of pronotum with a dark pink stripe. Elytral punctation dense and strong. Jalisco, Mexico ..... *Plusiotis alticola* Bates
4′. Sides of pronotum green. Elytral punctation sparse and very fine. Guatemala 5
5. Clypeus semitrapezoidal-rounded. Pronotum with sparse and very fine punctures. Humeral calla of elytra golden ..... *Plusiotis pehlkei* Ohaus
5′. Clypeus semitrapezoidal slightly emarginated at middle. Pronotum with dense and strong punctures. Humeral calla of elytra green ..... *Plusiotis centralis* Morón
6. Clypeus semitrapezoidal. Sides of pronotum green, with the lateral borders angulated. Humeral calla of elytra golden. Guerrero, Mexico ..... *Plusiotis purpurata* Morón
6′. Clypeus semicircular or semitrapezoidal. Sides of pronotum with a dark pink stripe and its lateral borders rounded. Humeral calla of elytra green. Jalisco, Hidalgo, Mexico 7
7. Clypeus semitriangular. Labrum medially strongly excavated, its ventral border sinuate and toward inside. Distal margin of pronotum complete. Prosternal process small with dense setae. Hidalgo, Mexico ..... *Plusiotis difficilis* Morón
7′. Clypeus semicircular. Labrum medially slightly excavated, its ventral border truncate and exposed. Distal margin of pronotum incomplete. Prosternal process prominent with sparse setae. Veracruz, Mexico ..... *Plusiotis citlaltepetlamayatli* sp. nov.

DISCUSSION

The species of the *lecontei* group are restricted to highlands above 2,000 m, with an isolated distribution and usually associated with fir forests or cloud and coniferous forests. They are also associated with semicold or temperate humid and subhumid climate (sensu Garcia, 1973). Of the eight recognized species only one is distributed at north of the Eje neovolcanico transversal: *P. lecontei,* which is distributed from

southwestern U.S. to northwest of Mexico, between 2,000–3,000 m and associated with pine-oak forests with temperate subhumid climate. Four species are only found at the Eje neovolcanico transversal: *P. orizabae* with an insular distribution situated at the western, central and eastern regions of this mountainous system, between 2,800–3,800 m, associated with fir-pine or pine-fir forests with semicold or temperate subhumid climate; *P. difficilis* from the Sierra de Pachuca (Hidalgo state), between 2,500–2,750 m in fir-juniper forests and with semicold subhumid climate; *P. alticola* from the slopes of Volcan Nevado de Colima (Jalisco), between 2,600–3,600 m with fir-pine forests and a temperate subhumid climate; and *P. citlaltepetlamayatli* from the external slopes of the Volcan Citlaltepetl, between 2,400–2,700 m with pine-fir forests and a temperate humid climate. The remaining species are located south of Eje neovolcanico transversal: *P. purpurata* from the Sierra de Igualatlaco and Campo Morado (Guerrero) at the Sierra Madre del sur, between 2,000–2,800 m with pine-fir, pine-oak and cloud forests with temperate subhumid climate; *P. centralis* only known from the type locality at Quezaltenango in Guatemala associated with pine-oak forest and humid temperate climate at 2,200 m altitude; and *P. pehlkei* found along the Pacific escarpment of the northwestern end of the Guatemalan highlands, between 2,100–2,350 m with pine-oak forests (the last two species are located in areas below the Guatemalan fir-forests) (Morón, 1990). Distribution of the *lecontei* group and Mexican *Abies* species show great similarities. Both have their southern limit at the northwestern highlands of Guatemala; most of the species are primarily found between 2,400–3,600 m, at zones with high humidity with annual rainfall above 1,000 mm and with temperate or semicold conditions. Several species are distributed at the Eje neovolcanico transversal, fewer at the mountainous systems of the south and scarcely at the Western Sierra Madre; furthermore 75% (six species) of Mexican *Abies* and 83% (five species) of the Mexican species of the *lecontei* group are endemic to this country, and this jointly with their isolated distribution confers on them a relictual character (Rzedowski, 1978; Morón, 1990, 1991).

Based on this information, we suggest that the ancestral lineage of the *lecontei* group has dispersed through a corridor of fir or pine-fir forests, during its expansion to the Mexican mountains. This hypothesis is supported by the presence of fossil evidence of the genus *Abies* from Late Cretaceous at Coahuila State and from Miocene at Tehuantepec Isthmus (Rueda-Gaxiola, 1967 and Graham, 1972; cited by Rzedowski, 1978), which suggest the existence of adequate forest-zones for dispersal and posterior diversification of the *lecontei* group which since its origins could be associated with temperate conifer forests, with fir as the dominant or co-dominant tree. In contrast the *adelaida* group is also associated with temperate conifer forests with pine as the dominant tree, at lower altitudes and drier conditions than those of the *lecontei* group, so, continuous distribution of the pine or pine-oak forests prevents isolation of the *adelaida* group, which actually comprises only three species with wide distribution. It is likely that the climatic conditions have been a decisive factor in the dispersal and diversification process of some species groups.

Finally, Mexican fir forests occupy only 0.16% of national territory (Rzedowski, 1978) and are constantly being destroyed by mankind's activities. These problems and its low ecological tolerance to other habitats lead us to conclude that at least five species of *lecontei* group are in danger of extinction: *P. alticola, P. orizabae, P. difficilis,*

P. purpurata and *P. citlaltepetlamayatli* (we do not consider the other Mexican species because of its wide distribution).

ACKNOWLEDGMENTS

The authors thanks to G. Nogueira for the loan and donation of specimens, to A. Oyarzabal for the habitus illustration, to F. Capistran for the assistance during collecting trips, to M. A. Morón for the loan of material, and to H. Busch for the word processing. This work represents contribution of the "Diagnostic and conservation of the Biodiversity in Mexico" (0239-N107) project supported by CONACYT, as an action of the multinational program CYTED-D.

LITERATURE CITED

Garcia, E. 1973. Modificaciones al sistema de clasificación climatica de Koppen. Inst. Geogr., Univ. Nac. Auton. México, 1–246.

Morón, M. A. 1990. The beetles of the world, Vol. 10, Rutelini, part I—Science Nat. Compiegne, France, 1–145.

Morón, M. A. 1991. Estudio biogeográfico ecológico preliminar del genero *Plusiotis* Burmeister (Coleoptera:Melolonthidae, Rutelinae). G. it. Ent. 5:309–323.

Rzedowski, J. 1978. La Vegetacion de Mexico. Ed Limusa, Mexico, 432 pp.

Received 19 January 1993; accepted 26 July 1993.